

Mail Stop: Appeal Brief
PATENT
4303-1007

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of

Rainer OBWEGER et al.

Conf. 8998

Application No. 10/560,812

Group 1792

Filed December 15, 2005

Examiner Naomi Birbach

DEVICE AND METHOD FOR WET TREATING DISC-LIKE SUBSTRATES

APPEAL BRIEF

Assistant Commissioner for Patents
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July 12, 2010

MAY IT PLEASE YOUR HONORS:

1. Real Party in Interest

The real party in interest in this appeal is:

LAM RESEARCH AG, SEZ-STRASSE 1, A-9500 VILLACH,
AUSTRIA.

2. Related Appeals and Interferences

None.

3. Status of Claims

Claims 3, 19, 26 and 36 have been cancelled. Claims
1, 2, 4-18, 20-25, 27-35 and 37 are pending in the application,

in which claims 18, 20-21, 32-35 and 37 have been withdrawn and claims 1, 2, 4-17, 22-25 and 27-31 have been finally rejected, from which this appeal is taken.

4. Status of Amendments

Per the Advisory Action of April 21, 2010, the Amendment filed on April 8, 2010, which filed subsequent to the final rejection mailed January 8, 2010, was not entered.

The claims at issue are thus those set forth in the amendment filed April 22, 2009.

5. Summary of Claimed Subject Matter

Independent claim 1: As is set forth in independent claim 1, the present invention pertains to a device for wet treatment of wafers, including:

a first plate (31) (Page 1, lines 35-38) ;

a second plate (32) substantially parallel to the first plate (31) (Page 2, line 1);

holding means (35) for holding a wafer between the first (31) and the second plate (32) substantially parallel to the plates (Means-plus-function, Page 2, lines 2-3; Page 9, lines 4-15; Page 11, lines 32-33);

first dispensing means (21, 22) for introducing fluid into a first gap (G1) between the first plate and a wafer when being treated (Means-plus-function, Page 2, lines 4-5; Page 10, lines 21-27);

second dispensing means (6) for introducing fluid into a second gap (G2) between the second plate (32) and a wafer when being treated (Means-plus-function, Page 2, lines 6-7; Page 10, lines 10-20; Page 12, lines 2-4);

at least one vibrating element (4) acoustically coupled to at least the second plate (32) (Page 2, line 8) ; and

rotating means (8) for rotating the holding means (35) and the second plate (32) relative to each other about an axis substantially perpendicular to the second plate (32) (Means-plus-function, Page 2, lines 10-11; Page 2; line 36 - Page 3, line 9; Page 8, lines 36-37; Page 11, lines 33-35).

Independent claim 22: As is set forth in independent claim 22, the present invention pertains to a device for wet treatment of wafers, including:

a first plate (31) (Page 6, line 1);

holding means (35) for holding a wafer in a certain distance substantially parallel to the first plate (31) (Means-plus-function, Page 6, lines 2-3; Page 9, lines 4-15; Page 11, lines 32-33);

first dispensing means (21, 22) for introducing fluid into a first gap (G1) between the first plate and a wafer when being treated (Means-plus-function, Page 6, lines 4-5; Page 10, lines 21-27);

at least one vibrating element (4) acoustically coupled to the first plate (Page 6, line 6);

rotating means (8) for rotating the holding means (35) and the first plate (31) relative to each other about an axis substantially perpendicular to the first plate (31) (Means-plus-function, Page 6, lines 7-8; Page 2; line 36 - Page 3, line 9; Page 8, lines 36-37; Page 11, lines 33-35); and

adjustment-elements (32s) provided in order to direct ultrasonic waves at an angle α' of less than 89° to a wafer when treated wherein adjustment-elements include an array (64) of transducers (81A to 88H) with at least one ultrasonic generator to separately agitate the transducers in a phase-shifted way in order to generate an ultrasonic wave directed from the array of transducers at an angle α' of less than 89°

(Page 6, lines 12-16 and lines 28-34; Page 12, lines 20-28; Page 13, lines 34-37).

Independent claim 31: As is set forth in independent claim 31, the present invention pertains to a device for wet treatment of wafers, including:

a first plate (31) (Page 6, line 1);

holding means (35) for holding a wafer in a certain distance substantially parallel to the first plate (31) (Means-plus-function, Page 6, lines 2-3; Page 9, lines 4-15; Page 11, lines 32-33);

first dispensing means (21, 22) for introducing fluid into a first gap (G1) between the first plate and a wafer when being treated (Means-plus-function, Page 6, lines 4-5; Page 10, lines 21-27);

at least one vibrating element (4) acoustically coupled to the first plate (Page 6, line 6);

rotating means (8) for rotating the holding means (35) and the first plate (31) relative to each other about an axis substantially perpendicular to a second plate (32) (Means-plus-function, Page 6, lines 7-8; Page 2; line 36 - Page 3, line 9; Page 8, lines 36-37; Page 11, lines 33-35);

adjustment-elements provided in order to direct ultrasonic waves at an angle α' of less than 89° to a wafer when treated with the second plate substantially parallel to the first plate and second dispensing means for introducing

fluid into a second gap between the second plate and a wafer when being treated. (Page 6, lines 12-16)

Dependent claim 6: Dependent claim 6 differs from Claim 1 in its recitation that the second plate of itself is not rotatable (Page 3, lines 15-18).

Dependent claim 12: Dependent claim 12 differs from Claim 1 in its recitation that at least one of the at least one vibrating element is arranged with respect to the surface of the second plate facing the wafer so that ultrasonic waves are substantially directed to the wafer when treated taking an angle α' of 85° to 60° to the plane provided for the wafer (Page 4, lines 3-6).

Dependent claim 15: Dependent claim 15 differs from Claim 1 in its recitation that at least one vibrating element is arranged to cover the area of the rotational axis (Page 4, line 38 - Page 5, line 1).

Dependent claim 16: Dependent claim 16 differs from Claim 1 in its recitation that further comprising means (45) for opening and closing holding elements of the holding means during treatment of the wafer (Page 5, lines 2-5).

Dependent claim 17: Dependent claim 17 differs from Claim 1 in its recitation that wherein at least one plate at least partly includes material having a specific sound-propagation velocity greater than that of water (Page 5, lines 6-9).

Dependent claim 25: Dependent claim 25 sets forth that the intermediate chamber include an annular duct and an annular gas suction nozzle (Page 9, lines 22-25).

6. Grounds of Rejection to be Reviewed on Appeal

The first ground for review on appeal is whether claim 6 is sufficiently indefinite to support a rejection under 35 USC §112, second paragraph.

The second ground for review on appeal is whether claim 1, 2, 4-11, 13 and 14 are sufficiently unpatentable over U.S. Patent 6,632,292 ("AEGERTER") in view of U.S. Publication 2002/0050244 ("ENGESSER") and U.S. Publication 2002/0162570 ("CAVAZZA") to support a rejection under 35 USC §103(a).

The third ground for review on appeal is whether claim 12 is sufficiently unpatentable over AEGERTER in view of ENGESSER, CAVAZZA and U.S. Patent 6,890,390 ("AZAR") to support a rejection under 35 USC §103(a).

The fourth ground for review on appeal is whether Claim 15 is sufficiently unpatentable over AEGERTER in view of ENGESSER and CAVAZZA, and further in view of U.S. Patent 4,401,131 ("LAWSON") to support a rejection under 35 USC § 103(a).

The fifth ground for review on appeal is whether claim 16 is sufficiently unpatentable over AEGERTER in view of ENGESSER and CAVAZZA, and further in view of U.S. Patent 5,788,453 ("DONDE") to support a rejection under 35 USC § 103(a).

The sixth ground for review on appeal is whether claim 17 is sufficiently unpatentable over AEGERTER in view of ENGESSER and CAVAZZA, and further in view of U.S. Patent 6,532,977 ("OTSUKI") to support a rejection under 35 USC § 103(a).

The seventh ground for review on appeal is whether claims 22-24 and 27-30 are sufficiently unpatentable over AEGERTER in view of ENGESSER, CAVAZZA, U.S. Publication 2004/0132318 ("KIM") and AZAR to support a rejection under 35 USC §103(a).

The eighth ground for review on appeal is whether claim 25 is sufficiently unpatentable over AEGERTER in view of ENGESSER, CAVAZZA, KIM and AZAR, and further in view of U.S. Patent 5,762,708 ("MOTODA") to support a rejection under 35 USC §103(a).

The ninth ground for review on appeal is whether claim 31 is sufficiently unpatentable over AEGERTER in view of ENGESSER, CAVAZZA and U.S. Publication 20040132318 ("KIM") to support a rejection under 35 USC §103(a).

7. Argument

7.0 Summary Of Argument

The applied art does not teach or suggest substrate treating using rotating means for rotating the holding means and the second plate relative to each other about an axis substantially perpendicular to said second plate. Also, the means for rotating is not used to rotate the second plate itself, and the claimed invention is definite.

7.1 Claim 6 Is Not Indefinite Under 35 USC §112, Second Paragraph

The Office Action asserts that claim 6 is unclear because claim 1 recites "rotating means for rotating said second plate." and thus negates claim 6.

However, the Office Action incorrectly cited claim 1, which should be "rotating means for rotating the holding means and the second plate relative to each other about an axis..."

That is, the means for rotating is not used to rotate the second plate itself, as asserted in the Office Action. Instead, the rotating means is used to rotate the holding means and/or the second plate so these two devices can rotate relatively.

Further, it is absolutely clear that if two objects rotate relative to each other they have three options:

A: the first object (means for rotating) rotates and the second object (here the second plate) rotates in different speeds and/or in different directions.

B: the first object rotates and the second object does not rotate.

C: the first object does not rotate and the second object rotates.

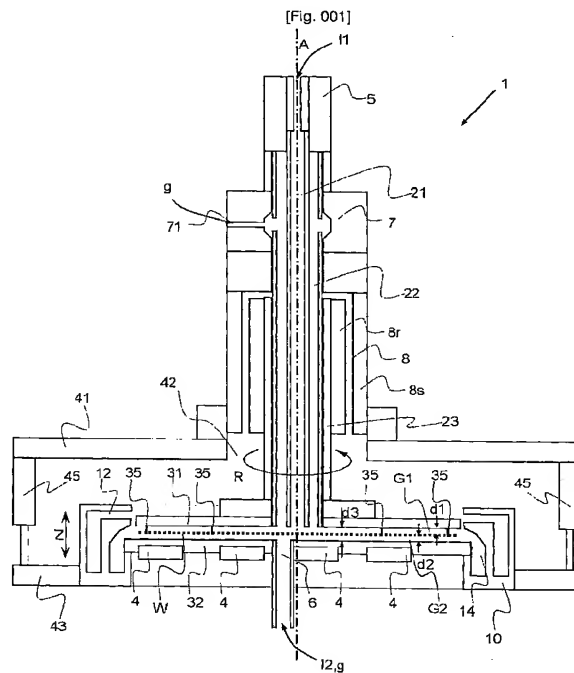
As should be clear from the specification, option B is the preferred one, where the means for holding and the first plate are coupled to each other.

There is thus no negation of claim 1 by claim 6.

The indefiniteness rejection under 35 USC §112, second paragraph should accordingly be withdrawn.

7.2 Rejection over AEGERTER, ENGESSER AND CAVAZZA

The wet treatment device of the present invention can be represented by Figure 1, which is reproduced below.



The present invention includes a first plate and a substantially parallel second plate, and a wafer is held

between the first and the second plate. During treatment a first dispenser introduces fluid into a first gap between the first plate and the wafer, and a second dispenser introduces fluid into a second gap between the second plate and the wafer. At least one vibrating element is acoustically coupled to at least the second plate, and a holder and the second plate are rotated relative to each other (the meaning of which has been discussed above) about an axis substantially perpendicular to the second plate.

AEGERTER pertains to wafer treatment. Figure 4 of AEGERTER is reproduced below.

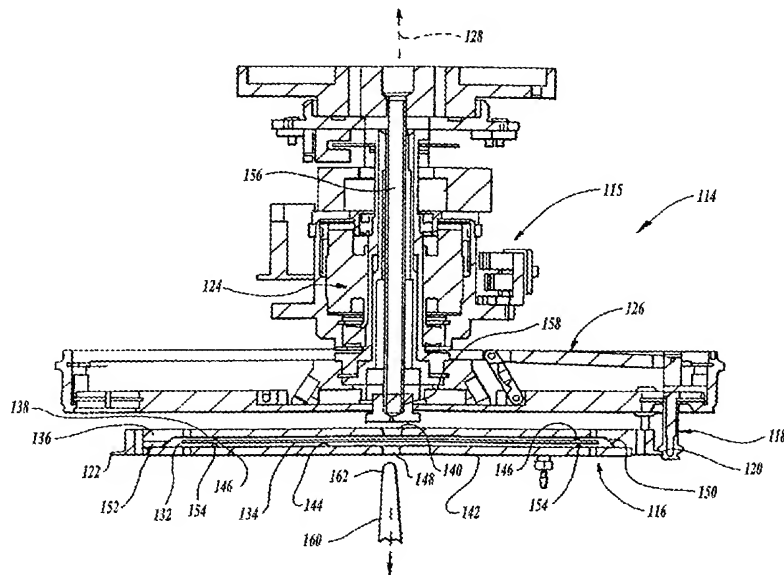


Fig.4

The device of AEGERTER includes a substantially parallel first plate and second plate, and holding means for holding a wafer between the first and said second plates. During treatment a first dispenser introduces fluid into a first gap between the first plate and a wafer, and a second

dispenser introduces fluid into a second gap between the second plate and the wafer.

However, AEGERTER does not disclose at least one vibrating element acoustically coupled to at least the second plate, and rotating means for rotating the holding means and the second plate relative to each other about an axis substantially perpendicular to said second plate.

Paragraph 9 of the Office Action of January 8, 2010 asserts: *"Aegarter discloses rotating means in the form of a rotor (Ref. #115) and rotor motor assembly (Ref. #124), in accordance with applicant's specification, for rotating the work piece housing, which includes the wafer and second plate, **relative to each other** about an axis substantially perpendicular to the second plate (Col. 9, lines 62-Col. 10, line 14; Figure 4)"* (Emphasis added).

This assertion totally neglects the fact that AEGERTER not at all discloses any rotation of wafer and second plate relative to each other (neither does the wafer rotate against the second plate nor does the second plate rotate against the wafer). The Office Action states that the housing rotates namely *"...work piece housing, which includes the wafer and second plate ..."*. So the Office understood that the wafer rotates together with the second plate. Therefore, it is not understood why the Office still could make such a misinterpretation that the wafer rotates and the second plate rotate relative to each other.

The Office Action also tries to differentiate between the phrase "*relative against each other*" and "*relative to each other*". However, it should be noted that the terms "*relative to each other*" and "*relative against each other*" basically have the same meaning, which is that these two plates separately move no matter whether they move in the same directions at different speeds or even in different directions. It is well known that the applicant can be his or her own lexicographer. See *In re Paulsen*, 30 F.3d 1475, 1480, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994).

The other applied art do not address at least the deficiencies of AEGERTER discussed above.

Further, some claim limitations of claim 1 clearly invoke 35 USC §112 sixth paragraph, which is set forth below:

"...rotating means for rotating said holding means and said second plate relative to each other about an axis substantially perpendicular to said second plate."

Regarding determining of patentability under this section, *In re Donaldson*, the Federal Circuit stated:

Per our holding, the "broadest reasonable interpretation" that an examiner may give means-plus-function language is that statutorily mandated in paragraph six. Accordingly, the PTO may not disregard the structure disclosed in the specification corresponding to such language when rendering a patentability determination. *In re Donaldson Co.*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994)

The Office Action also neglects the structural differences of the rotating means between present invention and AEGERTER.

In AEGERTER, the whole workpiece housing 116, which contains the first plate, the wafer and the second plate, is engaged to the rotor portion 115 only by the support members 118. Therefore, as described at column 10, lines 1-13 of AEGERTER, the workpiece housing is secured for co-rotation with hub portion, which is acknowledged by the Office Action.

On the contrast, the present invention pertains to have different ways to arrange the mounting means and the rotating means. The different combinations of the structure cause the three options discussed in section 7.1. (Also See Page 2, line 37 - page 3, line 9 of the specification).

At page 3, lines 15-18 of the current specification, the advantage of one of the embodiments of such the means for rotating is explained that:

The second plate not being rotatable brings the advantage that the plate carrying the vibrating element does not need to be rotated, which is positive with respect to the electronics typically attached or connected to vibrating elements such as piezoelectric transducers.

That is, the means for rotating is arranged in a way to have unexpected results from AEGERTER. Even if one skilled in the art couples a vibrating element to the second plate as taught by CAVAZZA, the combination would not achieve the present invention.

Therefore, AEGERTER does not teach or suggest the rotating means can rotate the holding means and the second plate relatively (such limitation is clear recited in the claim sets). Further, one skilled in the art would not be taught or suggested by AEGERTER to achieve the claimed structure.

EGESSER and CAVAZZA do not address at least the deficiencies of AEGERTER discussed above, and the combination of AEGERTER, EGESSER and CAVAZZA would not render the present invention *prima facie* unpatentable.

The unpatentability rejections based on AEGERTER should accordingly be withdrawn.

7.3 Rejection over AEGERTER, ENGESSER, CAVAZZA and AZAR

The failure of AEGERTER, ENGESSER and CAVAZZA to render the claimed embodiment obvious has been discussed above.

AZAR describes an ultrasonic cleaning method by using phased transducer arrays.

The Office Action asserts that the transducers of AZAR teach or suggest the angle of the current claimed embodiment.

However, the Office Action fails to explain that how the proposed modification could be incorporated in the combination of AEGERTER, ENGESSER and CAVAZZA and, if so, how AZAR would address the deficiencies of these references discussed above.

One of ordinary skill in the art would thus fail to produce a claimed embodiment of the present invention from a knowledge of AEGERTER, ENGESSER, CAVAZZA and AZAR. A *prima facie* case of unpatentability has thus not been made.

This unpatentability rejection should accordingly be withdrawn.

7.4 Rejection over AEGERTER, ENGESSER, CAVAZZA and LAWSON

Appellant refers to the above discussion of why claims 1, 2, 4-11, 13 and 14 on appeal are not unpatentable over AEGERTER, ENGESSER, CAVAZZA under 35 USC §103(a), which discussion applies equally to this ground of rejection. That is, LAWSON does not address the deficiencies of AEGERTER, ENGESSER and CAVAZZA discussed above. A *prima facie* case of unpatentability has thus not been made.

This unpatentability rejection should accordingly be withdrawn.

7.5 Rejection over AEGERTER, ENGESSER, CAVAZZA and DONDE

Appellant refers to the above discussion of why claims 1, 2, 4-11, 13 and 14 on appeal are not unpatentable over AEGERTER, ENGESSER, CAVAZZA under 35 USC §103(a), which discussion applies equally to this ground of rejection. That is, DONDE does not address the deficiencies of AEGERTER, ENGESSER and CAVAZZA discussed above. A *prima facie* case of unpatentability has thus not been made.

This unpatentability rejection should accordingly be withdrawn.

7.6 Rejection over AEGERTER, ENGESSER, CAVAZZA AND OTSUKI

Appellant refers to the above discussion of why claims 1, 2, 4-11, 13 and 14 on appeal are not unpatentable over AEGERTER, ENGESSER, CAVAZZA under 35 USC §103(a), which discussion applies equally to this ground of rejection. That is, OTSUKI does not address the deficiencies of AEGERTER, ENGESSER and CAVAZZA discussed above. A *prima facie* case of unpatentability has thus not been made.

This unpatentability rejection should accordingly be withdrawn.

7.7 Rejection over ENGESSER, CAVAZZA, KIM and AZAR

The failure of AEGERTER, ENGESSER and CAVAZZA to render the claimed embodiment obvious has been discussed above.

AZAR describes an ultrasonic cleaning method by using phased transducer arrays.

The Office Action asserts that the transducers of AZAR disclose the angle of the current claimed embodiment.

However, the Office Action fails to explain that how the proposed modification could be incorporated in the combination of AEGERTER, ENGESSER and CAVAZZA.

One of ordinary skill in the art would thus fail to produce a claimed embodiment of the present invention from a knowledge of AEGERTER, ENGESSER, CAVAZZA and AZAR. A *prima facie* case of unpatentability has thus not been made.

This unpatentability rejection should accordingly be withdrawn.

7.8 Rejection over AEGERTER, ENGESSER, CAVAZZA, KIM, AZAR and
MOTODA

Appellant refers to the above discussion of why present invention is not unpatentable over AEGERTER, ENGESSER, CAVAZZA, KIM and AZAR under 35 USC §103 (a), which discussion applies equally to this ground of rejection. MOTODA does not address these deficiencies sufficient to allege *prima facie* unpatentability.

This unpatentability rejection should accordingly be withdrawn.

7.9 Rejection over AEGERTER, ENGESSER, CAVAZZA and KIM

The failure of AEGERTER, ENGESSER and CAVAZZA to render a claimed embodiment unpatentable has been discussed above.

KIM describes an system and method for wet cleaning a wafer.

The Office Action asserts that KIM discloses the adjustment-element of the present claimed embodiment.

However, the Office Action fails to explain that how the proposed modification could be incorporated in the combination of AEGERTER, ENGESSER and CAVAZZA, or how KIM would fully address the deficiencies of these references.

One of ordinary skill in the art would thus fail to produce a claimed embodiment of the present invention from a

knowledge of AEGERTER, ENGESSER, CAVAZZA and KIM. A *prima facie* case of unpatentability has thus not been made.

This unpatentability rejection should accordingly be withdrawn.

8. Conclusion

The Appellants have demonstrated that the Examiner has failed to successfully allege that the rejected claims are indefinite or *prima facie* unpatentable. It is clear that applied art does not teach or suggest the claimed device and method for wet treating disc-like substrates cited in the claims 1, 2, 4-17, 22-25 and 27-31. For the reasons advanced above, it is respectfully submitted that all the rejected claims in this application are allowable. Thus, favorable reconsideration and reversal of the Examiner's objections to and rejections of claims under 35 USC §§112/103, by the Honorable Board of Patent Appeals and Interferences, are respectfully solicited.

Please charge the requisite Appeal Brief fee in the amount of \$540 which is being paid online simultaneously herewith by credit card.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future submissions, to charge any underpayment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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REG/jr
July 12, 2010
Enclosures: Claims Appendix

9. Claims Appendix

1. A device for wet treatment of wafers, comprising:

a first plate;

a second plate substantially parallel to said first plate;

holding means for holding a wafer between said first and said second plate substantially parallel to said plates;

first dispensing means for introducing fluid into a first gap between said first plate and a wafer when being treated;

second dispensing means for introducing fluid into a second gap between said second plate and a wafer when being treated;

at least one vibrating element acoustically coupled to at least said second plate; and

rotating means for rotating said holding means and said second plate relative to each other about an axis substantially perpendicular to said second plate.

2. The device according to claim 1, wherein said plates are substantially horizontally arranged.

4. The device according to claim 1, wherein holding means and first plate are coupled to each other to form a holding unit.

5. The device according to claim 1, wherein the holding means is a gripper provided for securely gripping a wafer.

6. The device according to claim 1, wherein said second plate of itself is not rotatable.

7. The device according to claim 1, wherein a liquid collector is circumferentially surrounding said holding means for collecting liquid that flows off a wafer during being treated with liquid.

8. The device according to claim 1, wherein said second plate is sealed against a liquid collector.

9. The device according to claim 1, further comprising means for varying distance from the first plate to the second plate to insert a wafer to the space defined between said two plates and to withdraw a wafer therefrom.

10. The device according to claim 1, further comprising a gap between the wafer and the first plate of 0.1 mm to 10 mm or 0.5 mm to 5 mm while treating the wafer.

11. The device according to claim 1, further comprising a gap between the wafer and the second plate of 0.1 mm to 10 mm or 0.5 mm to 5 mm while treating the wafer.

12. The device according to claim 1, wherein at least one of said at least one vibrating element is arranged with respect to the surface of the second plate facing the wafer so that ultrasonic waves are substantially directed to the wafer when treated taking an angle α' of 85° to 60° to the plane provided for the wafer.

13. The device according to claim 1, further comprising additional gas dispenser for at least one of said first and second gap.

14. The device according to claim 1, wherein an opening in at least one of said first or second plate does not include the rotational center.

15. The device according to claim 1, wherein at least one vibrating element is arranged to cover the area of the rotational axis.

16. The device according to claim 1, further comprising means for opening and closing holding elements of said holding means during treatment of the wafer.

17. The device according to claim 1, wherein at least one plate at least partly comprises material having a specific sound-propagation velocity greater than that of water.

22. A device for wet treatment of wafers, comprising:

a first plate;

holding means for holding a wafer in a certain distance substantially parallel to said first plate;

first dispensing means for introducing fluid into a first gap between said first plate and a wafer when being treated;

at least one vibrating element acoustically coupled to said first plate;

rotating means for rotating said holding means and said first plate relative to each other about an axis substantially perpendicular to said first plate; and

adjustment-elements are provided in order to direct ultrasonic waves at an angle α' of less than 89° to a wafer when treated wherein adjustment-elements comprise an array of a plurality of transducers with at least one ultrasonic generator to separately agitate said plurality of transducers in a phase-shifted way in order to generate an ultrasonic wave directed from said array of transducers at an angle α' of less than 89° .

23. The device according to claim 22, wherein said adjustment-elements comprise a slanted plane or slanted planes wherein at least one of said at least one transducers is placed.

24. The device according to claim 23, wherein said at least one transducer placed in a slanted plane is acoustically coupled to an intermediate liquid chamber, said intermediate liquid chamber is further acoustically coupled to said first plate.

25. The device according to claim 24, wherein said intermediate liquid chamber includes an annular duct and an annular gas suction nozzle.

27. The device according to claim 22, wherein said array of transducers is a two dimensionally arranged plurality of transducers.

28. The device according to claim 22, wherein a quotient of a distance a of the first plate to a wafer surface facing said first plate and a mean distance d between centers of two adjacent transducers of the array is greater than 5 ($a/d > 5$).

29. The device according to claim 22, wherein a mean distance d between centers of two adjacent transducers of the array is smaller than 2 mm.

30. The device according to claim 22, wherein a width D of the array of transducers is at least three times as big as the distance d_1 of the first plate to the wafer surface facing said first plate ($D \geq 3 \cdot d_1$).

31. A device for wet treatment of wafers, comprising:
a first plate;

holding means for holding a wafer in a certain distance substantially parallel to said first plate;

first dispensing means for introducing fluid into a first gap between said first plate and a wafer when being treated;

at least one vibrating element acoustically coupled to said first plate;

rotating means for rotating said holding means and said first plate relative to each other about an axis substantially perpendicular to a second plate;

adjustment-elements provided in order to direct ultrasonic waves at an angle α' of less than 89° to a wafer when treated with said second plate substantially parallel to said first plate and second dispensing means for introducing fluid into a second gap between said second plate and a wafer when being treated.

10. Evidence Appendix

None.

11. Related Proceedings Appendix

None.